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LCROSS: Volatiles and Exosphere Associated with a Permanently Shadowed Region in Cabeus

Posted May 3rd, 2010 by Diane Wooden

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We discuss the volatile species in the LCROSS data set in addition to water that were observed by the LCROSS Shepherding Spacecraft before its own demise in the four minutes following the first impact by the Centaur. The stochastic nature of the temporal variations observed by the nadir-viewing near-Infrared spectrometer combined with the diversity of the volatile species suggests that these species were in situ in the permanently shadowed crater and were released by a combination of the centaur impact and the resulting warming of the regolith by the impact and ejecta debris blanket. Adding to this intrigue are the pre-impact observations by the UV-Visual spectrometer which reveal that the field-of-view into the permanently shadowed crater contains UV emission lines. The UV lines are clearly revealed once the descent of the shepherding spacecraft narrows the field-of-view of the UV-Vis spectrometer so as to exclude any surrounding bright terrain. Our

suggestion is that this emission comes from tenuous gases, i.e., there appears to be a potential association between the cold, permanently shadowed region and an exosphere.

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